Nitrogen budgets of citrus trees fertilized with controlled release fertilizer

Final Report
Contract # 11948
Reporting period (10/11/06-10/11/07 with final harvest in 12/07 and 2/08)

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Field tests were completed in 2008 with the harvest of the last Hamlin and Flame crops. This final report reflects that information for four years and the leaf N data.

Hamlin yield data for four years is presented in Table 1. These yield data were collected for the next harvest season past the end of the project funding.
Although no significant differences were obtained, the higher rate of Nitamin 30L produced a numerically reduced yield in 06-07, but not in any other year. No significant differences were determined between the treatments in the grapefruit plots. The relatively low yields continued for the four years, apparently due to the long term effects of the 2004 hurricanes which had a similar effect on all citrus in Central Florida.

Table 1. Yields of Hamlin (H) orange and Flame (F) grapefruit trees for four years of treatment in central Florida.

Year	**Quick Release Grd Fertilizer**	**Nitamin 30L 120 lbs N/ac**	**Citriblen 90 lbs N/ac**	**Nitamin 30L 150 lbs/ac**
04-05 H	**1.2**	**1.2**	**1.1**	**1.3**
05-06 H	**1.3**	**1.4**	**1.5**	**1.5**
06-07 H	**1.8**	**1.8**	**1.7**	**1.5**
07-08 H	**2.0**	**2.1**	**2.1**	**2.1**
04-05 F	**2.2**	**1.9**	**2.1**	
05-06 F	**2.1**	**2.3**	**2.3**	
06-07 F	**2.8**	**2.4**	**2.8**	
07-08 F	**3.1**	**3.2**	**3.2**	

No significant differences between treatments

No differences were found in soluble solids per box from any of the treatments for the four years (Table 2), except that in 2007-08 the values were higher for the two treatments in Hamlin oranges receiving 150 lbs N/acre than either of the lower rates with Citriblen

or Nitamin. For grapefruit, the Citriblen treatment in 2006-07 had slightly lower solids/box.

Other juice quality factors (juice content, Brix, Acidity, B/A ratio) were measured and by and large were not significantly different by treatments for more than one or two of the four years.

Table 2. Pounds solids per box for Hamlin (H) orange and Flame (F) grapefruit for the four study years with different N source treatments.

Year	Quick Release Grd Fertilizer	Nitamin 30L 120 lbs N/ac	Citriblen 90 lbs N/ac	Nitamin 30L 150 lbs/ac
04-05 H	**5.6**	**5.3**	**5.4**	**5.6**
05-06 H	**6.0**	**5.9**	**5.8**	**6.0**
06-07 H	**5.8**	**5.6**	**5.5**	**5.5**
07-08 H	**5.1 b**	**4.9 a**	**4.8 a**	**5.1 b**
04-05 F	**4.8**	**4.8**	**4.6**	
05-06 F	**4.8**	**4.7**	**4.6**	
06-07 F	**4.6 b**	**4.5 ab**	**4.4 a**	
07-08 F	**5.0**	**4.6**	**4.7**	

Since the main objective was to test various sources of nitrogen, leaf N values were taken each year (Table 3). In the Hamlin orange plots, the higher rate of Nitamin (Unity for year one) resulted in higher levels of leaf N than any of the other treatments including quick release N applied to the ground. In the fourth year, the Citriblen treatment had significantly lower leaf N than the other treatments in Hamlin, but this had not yet affected yields. Perhaps with higher yields this rate of application would have been inadequate.

For the grapefruit plots, the only significant difference in leaf N occurred in the fourth year when both the Nitamin and Citriblen treatments had lower N than the quick release N ground treatment, which received 60 or 30 lbs more N per acre than these treatments, respectively.

Table 3. Leaf N (% dry weight) for Hamlin (H) orange and Flame (F) grapefruit over four years of treatments with controlled or slow release forms of N.

Year 222.83	**Quick Release Grd Fertilizer**	**Nitamin 30L 120 lbs N/ac**	**Citriblen 90 lbs N/ac**	**Nitamin 30L 150 lbs/ac**
04-05 H	**2.69 a**	**2.71a**	**2.78 ab**	**2.87 b**
05-06 H	**2.70**	**2.75**	**2.74**	**2.72**
06-07 H	**2.78**	**2.70**	**2.73**	**2.68**
07-08 H	**2.75 b**	**2.69 b**	**2.52 a**	**2.83 b**
04-05 F	**2.25**	**2.28**	**2.35**	
05-06 F	**2.23**	**2.26**	**2.24**	
06-07 F	**2.30**	**2.32**	**2.30**	
07-08 F	**2.26 b**	**2.04 a**	**2.03 a**	

Leaf P and K levels were within the acceptable range but showed some small significant differences by treatment in a couple of the years (not shown).

In summary, none of the treatments affected yields even though the slow release (Nitamin) and controlled release (Citriblen) materials were applied at lower N rate levels than the quick release N source. This apparent greater efficiency may have been due to the relatively low yields following the 2004 hurricanes. Data from higher yielding locations is still desirable.

This data and a companion study of foliar application of Nitamin to Valencia orange trees are being presented and published in the Florida State Horticultural Society 2008 meeting and proceedings.